CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2017

FINAL EXAMINATION	**DURATION**
ENG311 – Geomechanics	Reading Time: **10** minutes Writing Time: **120** minutes

INSTRUCTIONS TO CANDIDATES

If necessary, make appropriate assumptions and state your assumptions

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a RESTRICTED OPEN BOOK examination

Any non-programmable calculator is permitted

No handwritten notes are permitted

Hard copy, unannotated English translation dictionary only

ADDITIONAL AUTHORISED MATERIALS	**EXAMINATION MATERIALS TO BE SUPPLIED**
No additional printed material is permitted	1 x 16 Page Book 1 x Scrap Paper Formula Sheet/s

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Section A (Each question worth 4 marks)

Attempt all questions

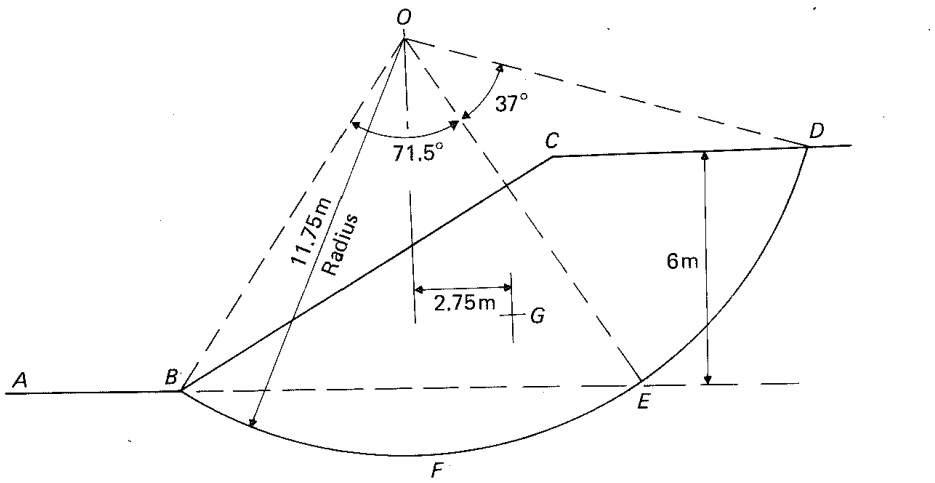
1. List the different kinds of mechanical stabilisation we can use.
2. What is the difference in the analysis of the stability of infinite slopes and that of finite slopes?
3. What is stability number and what are the factors on which it depends?
4. Discuss the difference between Rankine and Coulomb theory as regard to earth pressure
5. Discuss the possible failure modes for rigid retaining walls.
6. What is meant by Net ultimate bearing capacity of soil?
7. There instances in which foundations are subjected to moments in addition to the vertical load. In such cases, the distribution of pressure by the foundation on the soil is not uniform. Explain the statement
8. Discuss the difference between the Terzaghi and the Meyerhof bearing capacity equation.
9. Discuss the different kinds of foundations we can adopt with examples.
10. What is the difference in the theory of Point bearing pile and Friction pile?

Section B (Each question worth 20 marks)

Attempt all questions

1.

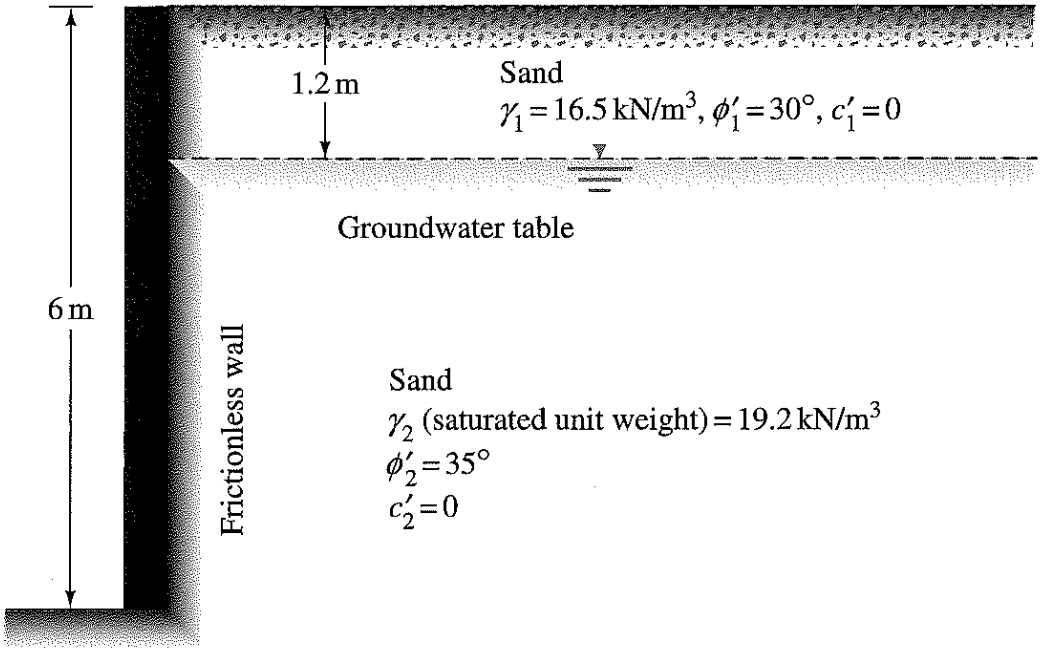
Shown below is a section of a clay bank. A trial slip surface bed is chosen in the form of circular arc of radius 11.75m. The area of the figure BCDEF is 87m^2 and its centroid is at G. Average density of soil is 1.76Mg/m^3. Above the level of the line ABE the cohesion of the soil is 21.5 kN/m^2 and below this level 33.75 kN/m^2. Calculate the factor of safety on this surface. Take ϕ=0.



(From Soil Mechanics by BHC Sutton)

2.

A retaining wall is shown below. Determine Rankine active force per length at different depth and sketch the variation. Also determine the location of the resultant.



(From Geotechnical Engineering by Braja M.Das and N.Sivakugan)

3.

A square foundation is 2mx2m in plan. The soil supporting the foundation has friction angle = $25^0$and cohesion = 20 kN/m^2. The unit weight of soil is 16.5 kN/m^3. Determine the allowable gross load on the foundation with a factor of safety of 3. Assume the depth of the foundation is 1.5m and that general shear failure occurs in the soil.

N_C = 25.13

N_q = 12.72

N_γ = 8.34

Useful Formulae and Table:

$K_a = (1-\sin\phi)/(1+\sin\phi)$

$K_P = (1+\sin\phi)/(1-\sin\phi)$

$K_o = 0.44+0.0042PI$

$N = \gamma' H/c_{u.mob}$

$q_{ult} = 1.3cN_c + \gamma'_1 D_f N_q + 0.4B\gamma'_2 N_\gamma$